

Withania somnifera - an endangered medicinal plant from lohardaga district of jharkhand.

Veena kumari and P.k.mishra

P.G.Dept of Botany, Vinoba Bhave University. Hazaribag, Jharkhand-835301.

Abstract:

Withania somnifera L. Dunal is an important medicinal plant that belongs to the family solanaceae. Due to the over exploitation from natural resources for medicinal purposes the plant has been listed as endangered hence IUNC has placed it in 'red data book'. Recently this species has been spotted in jungal of lohardaga district of Jharkhand state.

Keywords: withania somnifera, endangered, medicinal plant, red data book.

Introduction:

According to red list of threatened species, 44 plant species are critically endangered, 113 endangered and 87 vulnerable. *Withania somnifera* proved to be 99.75% of the endangered medicinal plants (Sharma *et al*, 2010; Rahman, 1993). As over harvesting of *W. somnifera* that plant root is going to be endangered condition in the Southern India (Manickam *et al*, 2000). *W. somnifera* has been utilized in Ayurveda system of medicine for over 3000 years. It is described

as an herbal tonic and healthy food in vedas and considered as 'Indian Ginseng' in traditional Indian system of medicine (Singh *et al*, 2006).

Study Area:

Lohardaga district is one of the twenty four districts of the Indian state of Jharkhand. The district is situated between 23° 30' and 23°40' north latitudes and 84°40' and 84°50' east longitudes. The district covers an area of 1491 km². Its two blocks, i.e kisko and senha have large area under dense forest cover. The forest cover is around 32-35 % of the total area of the district.

Plant profile:



Kingdom – Plantae

Order – Solanales

Family – Solanaceae

Genus – Withania

Species – *W.somnifera*

Botanical name – *Withania somnifera*.

Taxonomic Description:

Withania somnifera L. (Dunal) belongs to family solanaceae and is classically known for its rejuvenating benefits. It has recently been referred to as Indian ginseng for its reputed restorative benefits. The wild plant is generally an erect branching shrub, grows approximately up to a height of one meter (Sivanesan, 2008). This species is a dense, hairy, erect, tender perennial shrub growing 35-75 cm (14-30 in) tall. Tomentose branches extend radially from a central stem. Whole parts are covered with whitish stellate trichomes. Branching is extensive; leaves are simple, alternate or sub-opposite, ovate, entire, basis cunate, dull green, elliptic usually up to 10-12 cm (4-5 in) long.

The flowers are small, green and bell-shaped. Roots are stout, long tuberous, fleshy, and whitish-brown; the ripe fruits are orange red or red-yellow berry, smooth, up to 6mm in diameter. Seeds are yellow and 2.5 mm in diameter.

English name: Winter cherry.

Unani name: Asgand, Asgand Nagori.

Hindi name: Asgandha, Ashwagandha.

Trade name: Ashwagandha, winter cherry, Indian ginseng, poison goose berry.

Ayurvedic name: Ashwagandha.

The name ashwagandha is a combination of the sanskrit words, 'ashva' and 'gandha'. The meaning of ashwagandha is smell reflecting that the root has a strong horse like order [1].

Habitat:

Withania somnifera (L) Dunal, is an erect, evergreen, perennial shrub and member of Solanaceae family is a widely used medicinal plant useful in the treatment of inflammatory, anti-tumour agent (Naidu *et al.*, 2003). It is well known for years as an important drug in Ayurvedic Literature-Root of the plant reportedly exhibit antioxidant immunomodulatory and haematopoietic properties (Mishra *et al.*, 2000). Ashwagandha roots used in Ayurveda and Unani medicines. Roots are prescribed as medicines for hiccups, several female disorders, bronchitis, rheumatism, dropsy, and stomach and lung inflammation and skin diseases. The ingredient in medicines prescribed for curing disability and sexual weakness in males (Joshi *et al.*, 2010). Ashwagandha is considered to be one of the best rejuvenating agents in Ayurveda. It is reported to have antitumor, radiosensitizer, antistressor, immunomodulatory, antiinflammatory and antibacterial effects (Umadevi 1996; Archana and Namasivayam 1999; Uma Devi *et al.*, 1992). It has been employed for numerous conditions in

traditional Asian therapies and for additional disorders in contemporary herbal practice.

A major traditional use of the herb is in 'balancing life forces' which may be regarded as an adaptogenic or antistress tonic effect. Thus ashwagandha is considered to be a general promoter of health, or a "rasayana" that promotes rejuvenation according to traditional Ayurvedic practice (Sangwan, N.2008). The roots are the main portion of the plant used therapeutically (Weiner and Weiner 1994). Ashwagandha is reported to have anti-carcinogenic effects in animal and cell cultures by decreasing the expression of nuclear factor- κ B, suppressing intercellular tumor necrosis factor and potentiating apoptotic signalling in cancerous cell lines (Ichikawa *et al.*, 2006).

Chemical components:

The main constituents of *Withania somnifera* are alkaloids and withanolides. Withanolides – which are triterpene lactones- withanolides, withaferin A, alkaloids, steroidal lactones, tropine and cuscohygrine [2]. Some 40 withanolides, 12 alkaloids and numerous sitoindosides have been isolated [3].

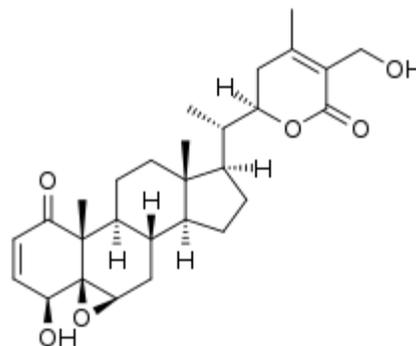
Withanolide:

CAS number: 30655-48-2

Molecular formula: $C_{28}H_{38}O_6$

Molecular weight: 470.6 g/mol

Structural name: Withanolide



e.g: withaferin A

The roots contain several alkaloids, withanolides, a few flavanoids and reducing sugars (Pandel *et al.*, 2013). The active compounds reported in *W.somnifera* include withaferin A, withasomniferin – A, sitoindosides VII –X, 5-dehydroxy withanolide- R, 2, 3-dihydrowithaferin-A, withanoside I-VII, physagulin D (Jayaprakasam *et al.*, 2003).

The active content of Indian *Withania somnifera* are withaferin-A and withanolide-D, both are present in leaves and roots of the plants and are used as a source of drugs. Total alkaloid content in the root of the Indian type has been reported to be between 0.13 to 0.31% of this plant showed antitumor and radio sensitizing effects in animal models (Sharma *et al.*, 2009).

Conclusion:

The active pharmacological components of *Withania somnifera* constituents are

withanolides and alkaloids. Which are present in leaves and roots of the plants and are used as a source of drugs. Due to the medicinal value, these plants are collected and used as raw material for large – scale medicinal industry, leading to over exploitation and it becomes an endangered plant species. One of the problems for commercial cultivation is, it takes long periods for seed germination strains productivity.

As it has been affirmed as an endangered plant by IUCN therefore it is a pressing need to conserve the plant by both *in situ* and *ex situ* multiplication. There is a great need of awareness among the local- community regarding community based approach in conservation. Active participation from everyone is highly needed for the conservation of this valuable but endangered plant species.

References:

1. "Ashwagandha"(https:// medline plus. gov/drug info / natural /953.html). Medline plus, US National Library of medicine. 26 june 2017. Retrieved 21 Dec. 2017.
2. "Ashwagandha" (<https://www.drugs.com/npp/ashwagandha.html>). Drugs. Com.2009. Retrieved 27 August 2017.
3. "Ashwagandha" (<https://www.drugs.com/npp/ashwagandha.html>). Drugs. Com.2009. Retrieved 27 August 2017.
4. Archana,R. and Namasivayam, A. (1999). Antistressor effect of *Withania somnifera*.*J. Ethnopharmacol.* **64**: 91-93.
5. Ichikawa, H., Takada, Y., Shishodia, S., Nair, M.G. and Aggarwal, B.B. (2006). Withanolides potentiate apoptosis, inhibit invasion and abolish osteoclastogenesis through suppression of nuclear factor-kappaB (NF-kappaB) activation and NF-kappaB- regulated gene expression. *Molecular Cancer Therapeutics.* **5** (6): 1434-45.
6. Jayaprakasam , B., Zhang, Y. Seeram, N.P.and Nair, M.G. (2003). Growth inhibition of human tumor cell lines by withanolides from *Withania somnifera* leaves. *Life sci.* **74**(1): 125-32.
7. Joshi, C., N. Gajbhiye, A. Phurailatpam, K.A. Geetha and S. Maiti, (2010). Comparative morphometric , physiological and chemical studies of wild and cultivated plant types of *Withania somnifera* (Solanaceae). *Curr .Sci.* **99**: 644-650.
8. Manickam , V.S., R.E. Mathavan and R. Antonisamy, (2000). Regeneration of Indian ginseng plantlets from stem callus. *Plant Cell Tissue Organ. Cult.* **62**: 181-185.
9. Mishra, L.C., Singh, B.B., Dagenais, S. (2000). Scientific basis for the therapeutic use of *Withania*

- somnifera* (Ashwagandha): A review. *Altern. Med. Rev.*, **5**: 334-346.
10. Naidu, P.S., A. Singh and S.K. Kulkarni, (2003). Effect of *Withania somnifera* root extract on haloperidol-induced orofacial dyskinesia: Possible mechanism of action. *J. Med. Food*, **6**: 107-114.
11. Paudel, S., Adhikari, S.R., Pant, B. (2013). Effect of colchicines on production of secondary metabolites from callus of *Withania somnifera* (L). *Journal of Nepal Biotechnology*, **3** (1): 15-18.
12. Rahman, A.U. (1993). New withanolides from *Withania* Sp. *J. Natural Product*, **56** (7): 1000-1006.
13. Sangwan, N. (2008). *In vitro* Withanolide Production by *Withania somnifera* (L). Cultures. *Z. Naturforsch*, **63**: 409-412.
14. Sharma, S., M.C. Sharma and D.V. Kohli. (2009). *In vitro* micropropagation of medicinally important roots and axillary bud combination. *Journal of Optoelectronic and biomedical materials*, **4**: 379-381.
15. Sharma. P.k., Singh, G., Dudhe, R., Singh, S. (2010). Biological activities of *Withania somnifera*. *Anul of Bio Research*, **1** (3): 56-63.
16. Singh, A.K. (2006). Flowering crops: Cultivation and management. *New Delhi: New India Publishing Agency*, pp.167-176.
17. Sivanesan, I., Murugesan, K. (2008). An efficient regeneration from nodal explants of *Withania somnifera* Dunal. *Asian Journal of Plant Science*. Vol. **7** (6): 551-556.
18. Uma D.P., Akagi, K. (1996). Withaferin A : A new radiosensitizer from the Indian medicinal plant *Withania somnifera* . *International Journal of Radiation Biology*. **69** (2): 193-197.
19. Uma Devi P, Sharada, A.C., Solomon, F.E. and Kamath, M.S. (1992). *In vivo* growth inhibitory effect of *Withania somnifera* (Ashwagandha) on a transplantable mouse tumor sarcoma 180. *Ind. J. Expt. Biol.* **30**: 169-172.
20. Weiner, M.A. and Weiner, J. (1994). Ashwagandha (Indian ginseng). In: Herbs that Heal. *Quantum Books, Mill Valley, CA*: 70-72.